NOTICE

The drivers and utilities for Octagon products, previously provided on a CD, are now in a self-extracting zip file located at the Octagon Systems web site on the product-specific page. Download this file to a separate directory on your hard drive, then double click on it to extract the files. All references in this manual to files and directories on the CD now refer to files in the Utilities zip file.

2430 Super VGA Video Card

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OCTAGON SYSTEMS®

Doc. Order #03973 Rev. 0603

Westminster, CO

Tech. Support: 303–426–4521

IMPORTANT!

Please read before installing your product.

Octagon's products are designed to be high in performance while consuming very little power. In order to maintain this advantage, CMOS circuitry is used.

CMOS chips have specific needs and some special requirements that the user must be aware of. Read the following to help avoid damage to your card from the use of CMOS chips.

Using CMOS Circuitry in Industrial Control

Industrial computers originally used LSTTL circuits. Because many PC components are used in laptop computers, IC manufacturers are exclusively using CMOS technology. Both TTL and CMOS have failure mechanisms, but they are different. This section describes some of the failures which are common to all manufacturers of CMOS equipment. However, much of the information has been put in the context of the Micro PC.

Octagon has developed a reliable database of customer-induced, field failures. The average MTBF of Micro PC cards exceeds 11 years, yet there are failures. Most failures have been identified as customer-induced, but there is a small percentage that cannot be identified. As expected, virtually all the failures occur when bringing up the first system. On subsequent systems, the failure rate drops dramatically.

- Approximately 20% of the returned cards are problem-free. These cards, typically, have the wrong jumper settings or the customer has problems with the software. This causes frustration for the customer and incurs a testing charge from Octagon.

- Of the remaining 80% of the cards, 90% of these cards fail due to customer misuse and accident. Customers often cannot pinpoint the cause of the misuse.

- Therefore, 72% of the returned cards are damaged through some type of misuse. Of the remaining 8%, Octagon is unable to determine the cause of the failure and repairs these cards at no charge if they are under warranty.

The most common failures on CPU cards are over voltage of the power supply, static discharge, and damage to the serial and parallel ports. On expansion cards, the most common failures are static discharge, over voltage of inputs, over current of outputs, and misuse of the CMOS circuitry with regards to power supply sequencing. In the case of the video cards, the most common failure is to miswire the card to the flat panel display. Miswiring can damage both the card and an expensive display.

- **Multiple component failures** - The chance of a random component failure is very rare since the average MTBF of an Octagon card is greater than 11 years. In a 7 year study, Octagon has never found a single case where multiple IC failures were not caused by misuse or accident. It is very probable that multiple component failures indicate that they were user-induced.

- **Testing "dead" cards** - For a card that is "completely nonfunctional", there is a simple test to determine accidental over voltage, reverse voltage or other "forced" current situations. Unplug the card from the bus and remove all cables. Using an ordinary digital ohmmeter on the 2,000 ohm scale, measure the resistance between power and ground. Record this number. Reverse the ohmmeter leads and measure the resistance again. If the ratio of the resistances is 2:1 or greater, fault conditions most likely have occurred. A common cause is miswiring the power supply.

- **Improper power causes catastrophic failure** - If a card has had reverse polarity or high voltage applied, replacing a failed component is not an adequate fix. Other components probably have been partially damaged or a failure mechanism has been induced. Therefore, a failure will probably occur in the future. For such cards, Octagon highly recommends that these cards be replaced.

- **Other over-voltage symptoms** - In over-voltage situations, the programmable logic devices, EPROMs and CPU chips, usually fail in this order. The failed device may be hot to the touch. It is usually the case that only one IC will be overheated at a time.

- **Power sequencing** - The major failure of I/O chips is caused by the external application of input voltage while the Micro PC power is off. If you apply 5V to the input of a TTL chip with the power off, nothing will happen. Applying a 5V input to a CMOS card will cause the current to flow through the input and out the 5V power pin. This current attempts to power up the card. Most inputs are rated at 25 mA maximum. When this is exceeded, the chip may be damaged.

- **Failure on power-up** - Even when there is not enough current to destroy an input described above, the chip may be destroyed when the power to the card is applied. This is due to the fact that the input current biases the IC so that it acts as a forward biased diode on power-up. This type of failure is typical on serial interface chips.

- **Serial and parallel** - Customers sometimes connect the serial and printer devices to the Micro PC while the power is off. This can cause the failure mentioned in the above section, *Failure upon power-up*. Even if they are connected with the Micro PC on, there can be another failure mechanism. Some serial and printer devices do not share the same power (AC) grounding. The leakage can cause the serial or parallel signals to be 20-40V above the Micro PC ground, thus, damaging the ports as they are plugged in. This would not be a problem if the ground pin is connected first, but there is no guarantee of this. Damage to the printer port chip will cause the serial ports to fail as they share the same chip.

- **Hot insertion** - Plugging cards into the card cage with the power on will usually not cause a problem. (**Octagon urges that you do not do this!**) However, the card may be damaged if the right sequence of pins contacts as the card is pushed into the socket. This usually damages bus driver chips and they may become hot when the power is applied. This is one of the most common failures of expansion cards.

- **Using desktop PC power supplies** - Occasionally, a customer will use a regular desktop PC power supply when bringing up a system. Most of these are rated at 5V at 20A or more. Switching supplies usually require a 20% load to operate properly. This means 4A or more. Since a typical Micro PC system takes less than 2A, the supply does not regulate properly. Customers have reported that the output can drift up to 7V and/or with 7-8V voltage spikes. Unless a scope is connected, you may not see these transients.

- **Terminated backplanes** - Some customers try to use Micro PC cards in backplanes that have resistor/capacitor termination networks. CMOS cards cannot be used with termination networks. Generally, the cards will function erratically or the bus drivers may fail due to excessive output currents.

- **Excessive signal lead lengths** - Another source of failure that was identified years ago at Octagon was excessive lead lengths on digital inputs. Long leads act as an antenna to pick up noise. They can also act as unterminated transmission lines. When 5V is switch onto a line, it creates a transient waveform. Octagon has seen submicrosecond pulses of 8V or more. The solution is to place a capacitor, for example 0.1 µF, across the switch contact. This will also eliminate radio frequency and other high frequency pickup.

DESCRIPTION

The 2430 Super VGA Card is a small, low power, video card that supports a wide variety of CRT and panel displays for high performance applications. The 2430 has 1 MB of video display memory.

The 2430 interfaces easily with standard VGA monitors with analog inputs using a DB–15 connector by using the 2430 CRT Adapter, Octagon P/N 4000. Flat panel displays are connected to the 2430 using a 50–position IDC connector.

MAJOR FEATURES

- Fully VGA, EGA, CGA, MDA and Hercules compatible.
- Supports analog CRT monitors, interlaced and non–interlaced, up to 800 x 600 x 256 colors, or 1024 x 768 x 256 colors.
- Supports monochrome LCD, EL and plasma flat panels up to 1280 x 1024 with 64 gray scales.
- Supports simultaneous CRT & flat panel display.
- Includes adjustable bias supply for LCD panel.
- PC/104
- 5V operation
- –40° to 85° C

HARDWARE INSTALLATION

The 2430 SVGA Video Card is installed on a 4010 or on any platform accepting a PC/104 type device.

WARNING: Octagon assumes no responsibility for any damage caused to flat panel displays and/or Micro PC video cards if the display is connected incorrectly.

Equipment

You will need the following equipment (or equivalent):

- 2430 SVGA Video Card and utility disk
- PC control card with a PC/104 interface
- *VGA compatible monitor with cable or flat panel display with cable
- PC SmartLINK
- Your PC

***NOTE:** If you are using an analog CRT monitor, you must purchase the CRT adapter from Octagon.

To install the 2430:

1. Please refer to Figure 1 for the location of various connectors before installing the 2430.

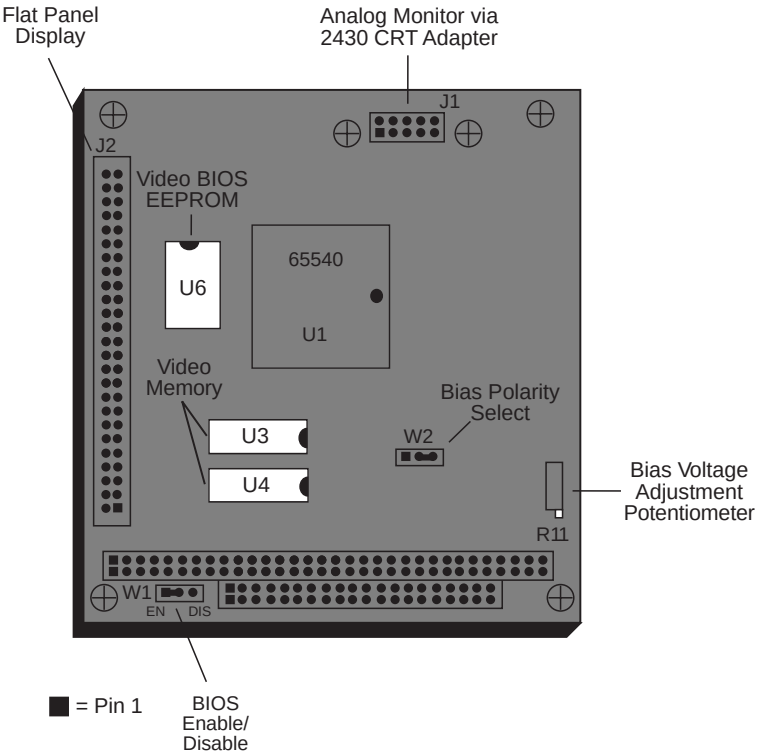

Figure 1—2430 Component Diagram

WARNING: The 2430 SVGA Video Card contains static–sensitive CMOS components. The greatest danger occurs when the card is plugged into another card. The 2430 card becomes charged by the user, and the static discharges to the system. To avoid damaging your card and its components:

1. Ground yourself before handling the 2430 card.
2. Disconnect power before removing or inserting the card.

Take care to correctly position the 2430 card onto the card that it is being installed on.

2. The 2430 is factory configured and programmed for a VGA analog monitor (W1[1–2] BIOS enable). If you are using a different monitor or flat panel display, you must reprogram the video BIOS for the appropriate display. See "Programming the 2430 EEPROM."

3. With the components on the 2430 facing upward, insert the pins beneath the card into the PC/104 connector of the CPU card.

4. Power on your system.

5. Refer to Figure 2 for a functional diagram of the 2430 card.

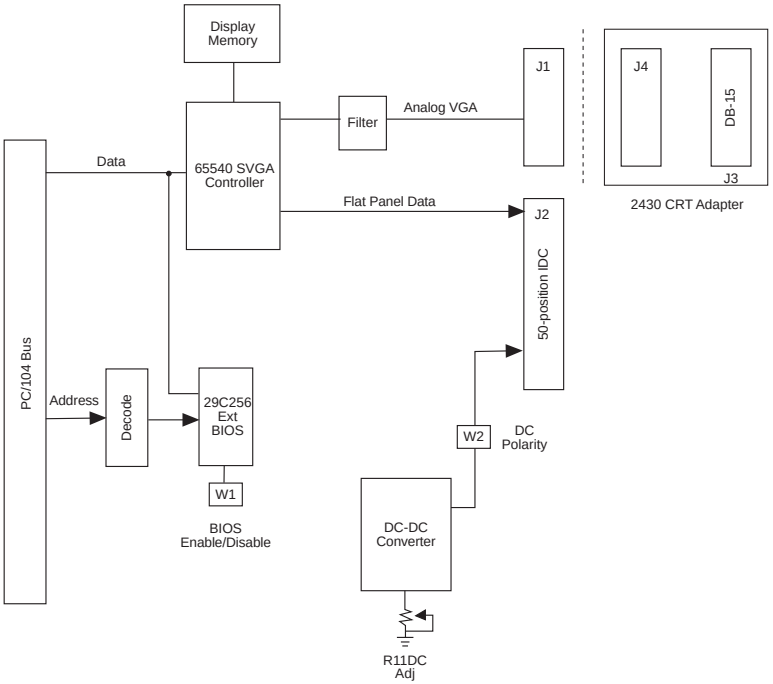

Figure 2—2430 Functional Diagram

PROGRAMMING THE 2430 EEPROM

The 2430 is factory configured and programmed to support a standard VGA monitor. If you are using the default monitor and have not previously reprogrammed the 2430, skip to section "Connecting the Monitor/Display".

If you are installing the 2430 in a Micro PC system and are using a monitor/display other than the default settings, read the following instructions. Programming the 2430 requires that you boot the Control Card from the BIOS drive, and establish a serial communications link between your PC and the Control Card.

To Program the 2430

The following instructions assume you are using the 2430 in a Micro PC system.

1. Make sure power to the 2430 is off.

2. Set jumper W1[2–3] on the 2430. This disables the BIOS on the 2430 and allows you to use the serial port on your Control Card.

BIOS Enable/Disable: W1	
Pins Jumpered	**Description**
[1-2]*	Enables the video BIOS
[2-3]	Disables the video BIOS

* = default

3. Start PC SmartLINK.

   NOTE: Disable any shadowing in the Control Card SETUP (e.g., 4010, 5025A, etc.).

4. Power on the Micro PC system. The Control Card logon message should display on your PC monitor.

5. Download the file, PGMVIDEO.EXE, and the *.DAT file for your display (e.g., STNDD.DAT) to your Control Card. Refer to your Control Card user's manual for detailed information on downloading files to the Control Card using the TRANSFER program.

   NOTE: If you are using a flat panel display, refer to the README.DOC file on the VGA 65540 Utilities Disk for a list of the supported displays. If your particular display is not currently listed, please contact Technical Support (303–426–4521) for assistance.

6. Change the jumpers to W1[1–2] which enables the 2430 BIOS.

   NOTE: Do not power off the 2430 when changing the jumper settings at W1.

7. To program the 2430 for the appropriate monitor/display, type the following:

   ```
   <drive>:PGMVIDEO <drive>:STNDD.DAT
   ```

   The <drive> designator is the read/write drive where you transferred the files from your PC. The *.DAT file should be changed to reflect the type of display you are using.

8. Enter 'Y' when asked if you want to proceed. The program PGMVIDEO then updates the video BIOS on the 2430. The system displays a message similar to the following:

   ```
              Video BIOS programming utility
   ------------------------------------------------
   PGMVIDEO Vers x.x.x Copyright(c) 1992-6 Octagon Systems Corp.
   ------------------------------------------------

   You must reboot after running this program.
   Make sure the jumper labeled EN-DIS is at the EN
   position.

   Do you want to continue? (Y/[N])
   Programming...Please wait.....................
   Verifying...Please wait.....................
   PGMVIDEO completed.
   ```

9. Power off the 2430 and install your monitor/display.

CONNECTING THE MONITOR/DISPLAY

The 2430 supports both a CRT monitor or a flat panel display. The programs CT.COM and FP.COM allow you to toggle between displaying the monitor and the flat panel. The program SM.COM allows you to display from the monitor and some types of flat panels simultaneously. These programs are found on the VGA 65540 Utilities Disk along with other diagnostic and configuration utilities.

The 2430 CRT Adapter Assembly is ordered separately. The kit (P/N 4000) includes an adapter card with a DB-15 connector, two stand-offs, two screws and two nuts. This adapter mates to the 2430 via J1, allowing connection to standard analog monitors.

Analog Monitor

1. The DB–15 connector supports an analog VGA color or monochrome monitor. Install the DB-15 connector at J1 and attach it securely with the stand-offs provided. (See Figure 3.) Plug the cable supplied with your monitor directly into the DB-15 connector.

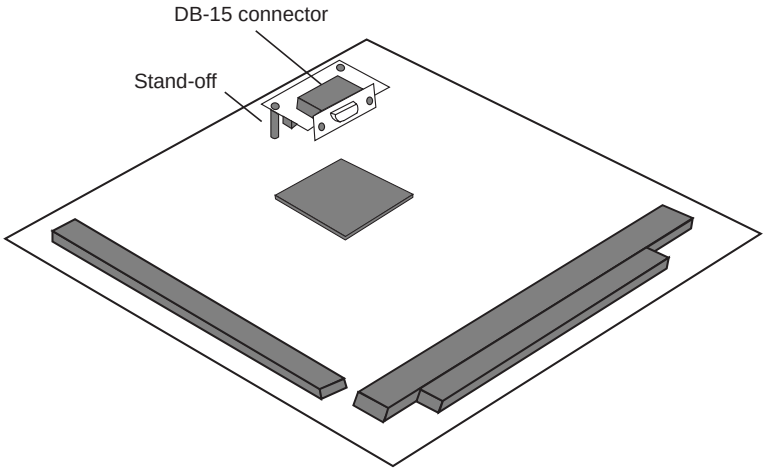

Figure 3—2430 with CRT Adapter Assembly

Analog Connector: J1	
Pin #	**Function**
1	Red
2	Green
3	Blue
4	Digital Gnd
5	Analog Gnd
6	Analog Gnd
7	Analog Gnd
8	Digital Gnd
9	NC
10	NC
11	NC
12	NC
13	H Sync
14	V Sync
15	NC

2. Make sure the BIOS jumper is enabled — W1[1–2].

3. Configure and program your Control Card for use with a video card and monitor.

4. Boot your Micro PC system.

5. A BIOS and DOS message similar to the following should appear on your video monitor:

```
Octagon xxxx BIOS vers x.xx
Copyright (c) 1994, Octagon Systems Corp.
All Right Reserved.
```

Flat Panel Display

1. The DC to DC converter is used to supply a DC voltage for the bias voltage required on some flat panel displays. This voltage must be set prior to connecting the display. A BIOS for the panel must already be programmed in the EEPROM.

2. Configure jumper block W2 for the polarity of the voltage required.

BIAS Polarity: W2	
Pins Jumpered	**Description**
[1-2]	Negative DC-DC output to J2, pin 3
[2-3]*	Positive DC-DC output to J2, pin 3

* = default

3. Power on the 2430 and measure Vee at J2, pin 3 and adjust R11 to the correct voltage for your display.

   NOTE: Without a flat panel BIOS programmed into the EEPROM and W1[1-2] installed, Vee will not come up.

4. Power off the 2430 and connect the flat panel display to the 2430 using a 50–position IDC connector. The following table lists the pin number and function for J2:

Flat Panel Connector: J2			
Pin #	**Function**	**Pin #**	**Function**
1	VDDSAFE (+5V)	2	+5VSAFE
3	VEESAFE	4	NC
5	ENABKL	6	Gnd
7	M	8	DE
9	Gnd	10	LP
11	FLM	12	Gnd
13	SFCLK	14	Gnd
15	PNL0	16	PNL1
17	Gnd	18	PNL2
19	PNL3	20	Gnd
21	PNL4	22	PNL5
23	Gnd	24	PNL6
25	PNL7	26	Gnd
27	PNL8	28	PNL9
29	Gnd	30	PNL10
31	PNL11	32	Gnd
33	PNL12	34	PNL13
35	Gnd	36	PNL14
37	PNL15	38	Gnd
39	PNL16	40	PNL17
41	Gnd	42	PNL18
43	PNL19	44	Gnd
45	PNL20	46	PNL21
47	Gnd	48	PNL22
49	PNL23	50	Gnd

NOTE: Several of these pins are multifunctional and change depending on the BIOS loaded. Refer to the README.DOC file on the VGA 65540 Utilities Disk for more information.

See the section “Flat Panel Connector Summary Reference” for information on the functional description of the pins for the different panel types.

5. Make sure the BIOS jumper is enabled — W1[1–2].

6. Configure and program your Control Card for use with a video card and monitor. Refer to your Control Card user's manual.

7. Power on your Micro PC System.

8. A BIOS and DOS message similar to the following should appear on your display:

```
Octagon xxx BIOS vers x.xx
Copyright (c) 1994, Octagon Systems Corp.
All Rights Reserved.
```

9. Due to loading of the Vee source, the Vee voltage will probably require additional adjustments at this time in order to obtain proper contrast. With the power on, re-measure Vee at J2 pin 3 and adjust R11 for the correct voltage.

TECHNICAL DATA

Power Specification

5V +/–5% at 300 mA

Environmental Specifications

–40° to 85° C operating
–50° to 90° C nonoperating
RH 5% to 95%, noncondensing

Interface

16–bit PC/104 ISA bus

I/O Map

Standard IBM compatible video I/O addresses

ROM BIOS
C000:0H—C000:7FFFH

Video Memory
1 MB Display Memory at A000H—BFFFH

Monitor Type
Analog RGB DB–15 connector VGA monochrome and VGA color.

Flat Panel
50–position IDC connector
Supports LCD, EL and plasma flat panels.

Flat Panel Mating Connector
Use Thomas & Betts Ansley 609-5030
or equivalent mating connector.

Size

2430 Board Only:
3.5 in. x 3.7 in. x 0.5 in.

2430 with CRT Adapter:
3.5 in. x 3.7 in. x 1.1875 in.

For further information, refer to the Chips & Technology data sheet for the 65540 High Performance Flat Panel/CRT VGA Controller.

PC BUS PINOUTS

PC/104 "A"			
Pin #	**Description**	**Pin #**	**Description**
A1	IOCHCHK*	A17	SD14
A2	SD7	A18	SD13
A3	SD6	A19	SD12
A4	SD5	A20	SHAH
A5	SD4	A21	SA10
A6	SD3	A22	SA9
A7	SD2	A23	SA8
A8	SD	A24	SA7
A9	SD0	A25	SA6
A10	IOCHRDY	A26	SA5
A11	AEN	A27	SA4
A12	SA19	A28	SA3
A13	SA18	A29	SA2
A14	SA17	A30	SHAH
A15	SA16	A31	SA0
A16	SA15	A32	Gnd

* = active low

PC/104 “B”			
Pin #	**Description**	**Pin #**	**Description**
B1	Gnd	B17	DACK1*
B2	RESETDRV	B18	DRQ1
B3	+5V	B19	REFRESH*
B4	IRQ9	B20	SYSCLK
B5	nc	B21	IRQ7
B6	DRQ2	B22	IRQ6
B7	nc	B23	IRQ5
B8	ENDXFR*	B24	IRQ4
B9	nc	B25	IRQ3
B10	(KEY)	B26	DACK2*
B11	SMEMW*	B27	TC
B12	SMEMR*	B28	BALE
B13	IOW*	B29	+5V
B14	IOR*	B30	OSC
B15	DACK3*	B31	Gnd
B16	DRQ3	B32	Gnd

* = active low

PC/104 "C"			
Pin #	**Description**	**Pin #**	**Description**
C0	Gnd	C10	MEMW*
C1	SBHE*	C11	SD8
C2	LA23	C12	SD9
C3	LA22	C13	SD10
C4	LA21	C14	SHED
C5	LA20	C15	SD12
C6	LA19	C16	SD13
C7	LA18	C17	SD14
C8	LA17	C18	SD15
C9	MEMR*	C19	(KEY)

* = active low

PC/104 "D"			
Pin #	**Description**	**Pin #**	**Description**
D0	Gnd	D10	DACK5*
D1	MEMCS16*	D11	DRQ5
D2	IOCS16*	D12	DACK6*
D3	IRQ10	D13	DRQ6
D4	IRQ11	D14	DACK7*
D5	IRQ12	D15	DRQ7
D6	IRQ15	D16	+5V
D7	IRQ14	D17	MASTER*
D8	DACK0*	D18	Gnd
D9	DRQ0	D19	Gnd

* = active low

FLAT PANEL CONNECTOR REFERENCE

The following table references the functional nomenclature for pins of the various flat panels that can be driven by the 2430 card.

Flat Panel Connector Summary											
2430 Video Card		Corresponding Flat Panel Signal Names									
Flat Panel Connector: J2		Mono Single Panel	Mono DD 8-bit	Mono DD 16-bit	Color TFT 16-bit	Color TFT 18/24-bit	Color TFT HR 18/24-bit	Color STN 4-bit Pack	Color STN Extended 4-bit Pack	Color STN DD 8-bit	Color STN DD 16-bit
Pin #	Function										
15	PNL0	PNL0	UD3	UD7	B0	B0	B00	R0...	R0	UR0...	UR0...
16	PNL1	PNL1	UD2	UD6	B1	B1	B01	G0...	B0	UG0...	UG0...
18	PNL2	PNL2	UD1	UD5	B2	B2	B02	B0...	G1	UB0...	UB0...
19	PNL3	PNL3	UD0	UD4	B3	B3	B03	R1...	R2	UR1...	UR1...
21	PNL4	PNL4	LD3	UD3	B4	B4	B10	G1...	B2	LR0...	LR0...
22	PNL5	PNL5	LD2	UD2	G0	B5	B11	B1...	G3	LG0...	LG0...
24	PNL6	PNL6	LD1	UD1	G1	B6	B12	R2...	R4	LB0...	LB0...

Flat Panel Connector Summary *continued*

2430 Video Card		Corresponding Flat Panel Signal Names									
Flat Panel Connector: J2 Pin #	Function	Mono Single Panel	Mono DD 8-bit	Mono DD 16-bit	Color TFT 16-bit	Color TFT 18/24-bit	Color TFT HR 18/24-bit	Color STN 4-bit Pack	Color STN Extended 4-bit Pack	Color STN DD 8-bit	Color STN DD 16-bit
25	PNL7	PNL7	LD0	UD0	G2	B7	B13	G2...	B4	LF1...	LF1...
27	PNL8			LD7	G3	G0	G00	B2...	SHFCLKU		UG1
28	PNL9			LD6	G4	G1	G01	R3...			UB1
30	PNL10			LD5	G5	G2	G02	G3...			UR2
31	PNL11			LD4	R0	G3	G03	B3...			UG2
33	PNL12			LD3	R1	G4	G10	R4...			LG1...
34	PNL13			LD2	R2	G5	G11	G4...			LB1...
36	PNL14			LD1	R3	G6	G12	B4...			LR2...
37	PNL15			LD0	R4	G7	G13	R5...			LG2...
39	PNL16					R0	R00				
40	PNL17					R1	R01				
42	PNL18					R2	R02				

Flat Panel Connector Summary *continued*

2430 Video Card		Corresponding Flat Panel Signal Names									
Flat Panel Connector: J2 Pin #	Function	Mono Single Panel	Mono DD 8-bit	Mono DD 16-bit	Color TFT 16-bit	Color TFT 18/24-bit	Color TFT HR 18/24-bit	Color STN 4-bit Pack	Color STN Extended 4-bit Pack	Color STN DD 8-bit	Color STN DD 16-bit
43	PNL19					R3	R03				
45	PNL20					R4	R10				
46	PNL21					R5	R11				
48	PNL22					R6	R12				
49	PNL23					R7	R13				
5	ENABKL	ENABKL	ENABKL	ENABKL	ENABKL	ENABKL	ENABKL	ENABKL	ENABKL	ENABKL	ENABKL
13	SHFCLK	SHFCLK	SHFCLK	SHFCLK	SHFCLK	SHFCLK	SHFCLK	SHFCLK	SHFCLK	SHFCLK	SHFCLK
7	M	M	M	M	M	M	M	M	M	M	M
10	LP	LP	LP	LP	LP	LP	LP	LP	LP	LP	LP
11	FLM	FLM	FLM	FLM	FLM	FLM	FLM	FLM	FLM	FLM	FLM
8	DE	DE	DE	DE	DE	DE	DE	DE	DE	DE	DE
1	VDDSAFE										

Flat Panel Connector Summary *continued*											
2430 Video Card		**Corresponding Flat Panel Signal Names**									
Flat Panel Connector: J2		**Mono Single Panel**	**Mono DD 8-bit**	**Mono DD 16-bit**	**Color TFT 16-bit**	**Color TFT 18/24-bit**	**Color TFT HR 18/24-bit**	**Color STN 4-bit Pack**	**Color STN Extended 4-bit Pack**	**Color STN DD 8-bit**	**Color STN DD 16-bit**
Pin #	**Function**										
2	+5VSAFE										
3	VEESAFE										
6,9,12,14, 17,20,23,26, 29,32,35,38, 41,44,47,50	GND										